



Flue gases from coal electric power plant

ELFI Technology Principal Characteristics

The ELFI technology is based on a new type of the high frequency corona discharge. As a consequence, the principal advantages of ELFI technology over other existing technologies for cleaning of flue gases (e.g. the electron-beam technology) are:

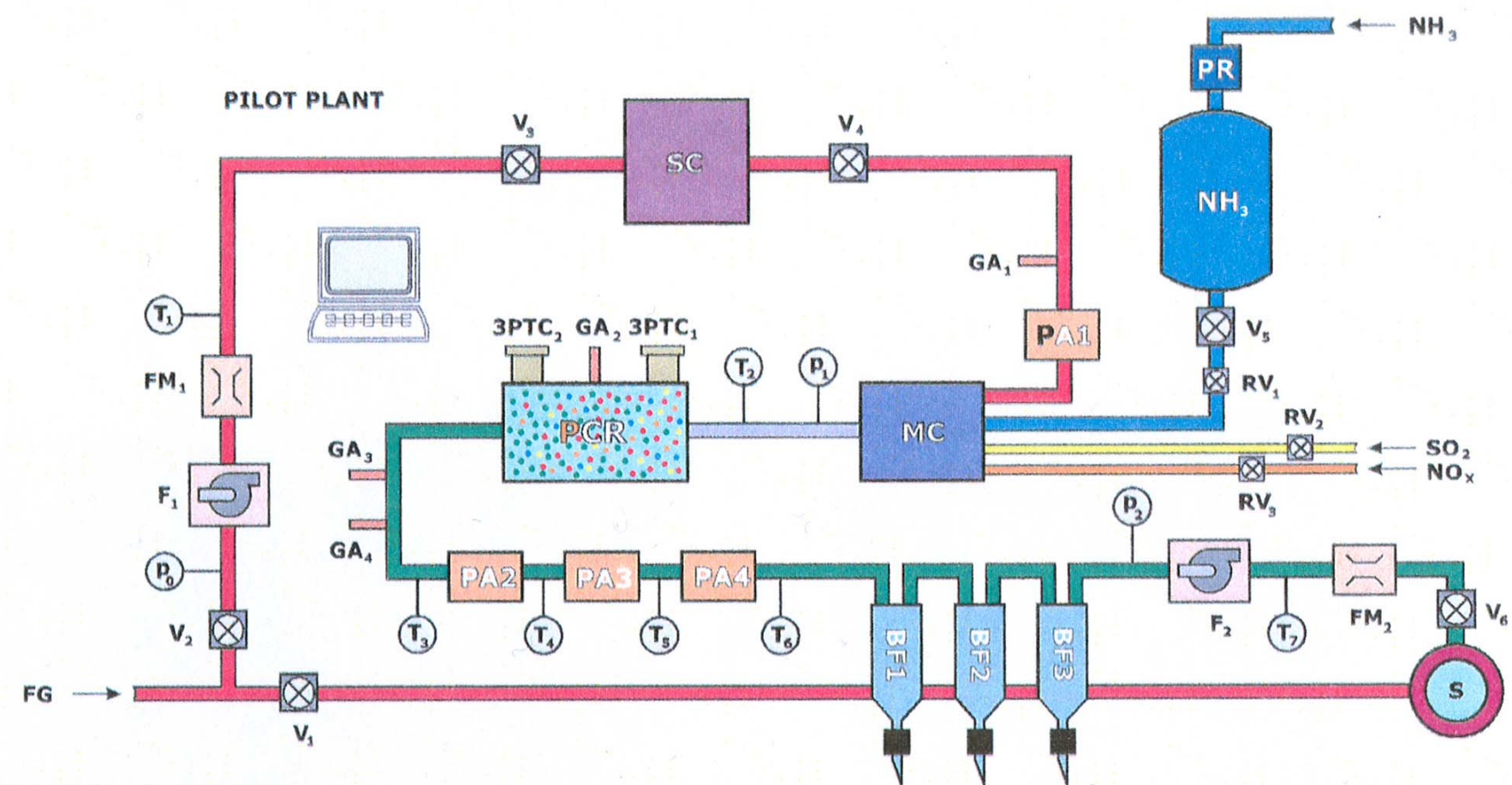
- Plasma is created in the whole volume of a plasma chemical reactor (PCR);
- It is possible to scale-up a plasma chemical reactor, so that a large flow of flue gases from a thermal plant can be processed, which is significant for industrial application of the ELFI technology.

One may find about other existing methods for cleaning of flue gases from SO_2 and NO_x in the article: "Plasmas join the fight against acid rain" by Graeme Lister, Physics World, December 1992, p. 19. By our knowledge no new technologies, except the ELFI technology, has been developed since the time the article by G. Lister was published.

Properties of the ELFI Technology

- This new, original technology using a plasma chemistry method is developed in the Institute of Nuclear Sciences "Vinča" on the basis of fundamental research of the original type of high frequency corona discharge.
- It is realized in the form of a special ELFI module which makes a part of a plant that burns fossil fuel.
- ELFI modules can be added to existing plants as a by-pass, so that it does not obstruct their function.
- SO_2 and NO_x are simultaneously removed from flue gas and converted into a useful artificial fertilizer.
- Waste materials are not produced by this technology, and the problem of permanent storage of undesired products does not exist.
- It consumes less electric energy for its functioning than other technologies.
- It is the only commercially efficient technology of this kind in the world.
- It produces high quality artificial fertilizer which has a commercial value.
- Removal of SO_2 and NO_x from flue gases contributes to protection of human environment from these pollutants, what directly affects favorably improvement of health of human population, prevention of creation of acid rains, and protection of buildings and metal constructions.
- It can be used in all plants that burn fossil fuels: electric power plants, mills, chemical industry, oil industry, thermal plants, and other plants.

ELFI New original technology for simultaneous removal of sulphur dioxide (SO_2) and nitrogen oxides (NO_x) from flue gases in plants which burn fossil fuel



Principle of operation

A flue gas of known characteristics (temperature, gas flow rate, and humidity) enters the plasma chemical reactor PCR, in which SO_2 and NO_x are being removed with addition of ammonia (NH_3) in stoichiometric ratio and converted into artificial fertilizer. Fertilizer is collected in bag filters BF1 - BF3, and flue gas without SO_2 and NO_x is passed through the stack S to atmosphere.

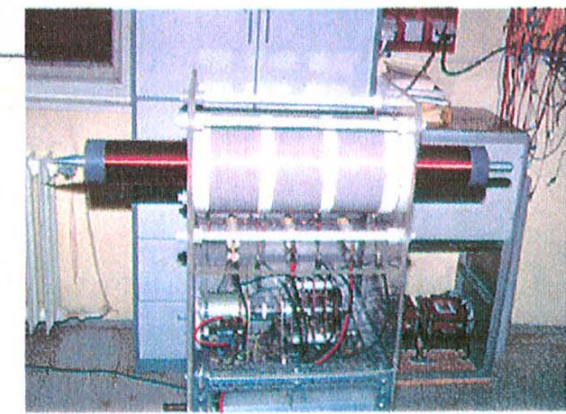
S - stack	MC - gas mixing chamber
FG - flue gas	PCR - plasma chemical reactor
V - valve	GA - gas analyzer
F - fan	PA - particle analyser
P - pressure gauge	3PTC - 3 Phase Tesla coil
T - thermometer	BF - bag filter
SC - spray cooler	RV - regulation valve
FM - pressure meter	PR - pressure regulator

The sole owner of the patents and patent application as well as the sole author of the ELFI technology is

- **Dr. Vujo Miljević, Research Professor of the Vinča Institute of Nuclear Sciences**
- **Address: P.O. Box 522, 11001 Belgrade, Serbia & Montenegro (former Yugoslavia)**
- **Phone/Fax: +381 11 432088**
- **E-mail: vumi@vin.bg.ac.yu**



Laboratory type of 3P-TC



Results achieved

- New technology is the results of fundamental research on which ELFI is based are presented on international scientific meetings.
- Laboratory studies completely fulfilled foreseen expectations for filtering and gave numerous data necessary to project pilot plant.
- The patents for ELFI technology were granted by: (1) the European Patent Office on 21 January 1998, European Patent No. 0602354; (2) the United States Patent and Trademark Office, United State Patent No. 5,807,526, Date of Patent Sep. 15, 1998; (3) Serbia & Montenegro, Intellectual Property Office, Patent No. 48832, Date 16 July 1998. The request for examination of the Japanese Patent Application No. 291184/1993 have been filed on October 26, 2000.